DOCUMENT RESUME

ED 078 693 EM 011 278

AUTHOR	Laird, Dugan
TITLE	A-V Buyer's Guide. A User's Look At the Audio-Visual World.
INSTITUTION	National Audio-Visual Association, Fairfax, Va.
PUB DATE	73
NOTE	40p.
AVAILABLE FROM	National Audio-Visual Association, Inc., 3150 Spring Street, Fairfax, Virginia 22030 ($2.50)
EDRS PRICE	MF-$0.65 HC Not Available from EDRS.
DESCRIPTORS	*Audiovisual Aids; Audiovisual Centers; Audiovisual Instruction; Equipment Standards; *Guides; *Instructional Media; *Purchasing

ABSTRACT

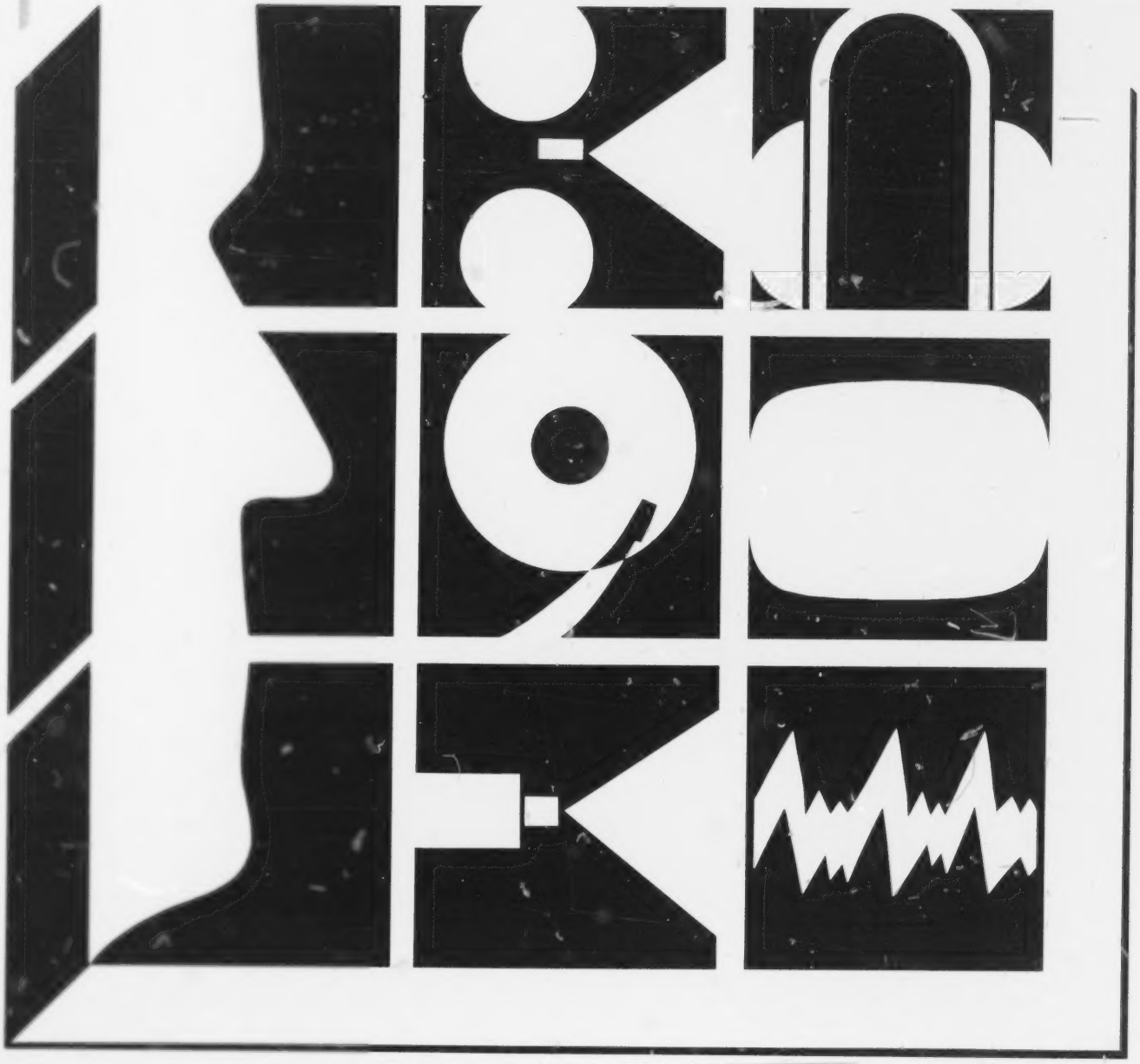
To enable a potential user to select the proper medium for his message, buy the appropriate equipment, and take proper care of it, this guide provides an accumulation of questions, answers, and tips on getting the most out of audiovisual buying decisions. Common questions about audiovisual equipment are discussed, along with more detailed presentations on 16 types of audiovisual equipment. (Author/RH)

ED 078693

A-V Buyer's Guide

A User's Look At The Audio-Visual World

by Dr. Dugan Laird



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A-V Buyer's Guide

A User's Look At The Audio-Visual World

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Design and Visualization: Mack R. Rowe

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Contents

4 INTRODUCTION

4 How This Paper Is Organized

6 COMMON QUESTIONS ABOUT A-V

7 Selecting the Proper Medium

8 Selecting the Vendor

9 Standardization

10 Performance Standards

10 Maintenance

12 TYPES OF A-V EQUIPMENT

13 Sound Projectors and Viewers

16 Filmstrip Projectors and Viewers

18 Slide Projectors

20 Overhead Projectors

22 Opaque Projectors

22 Special Purpose Projection Equipment

23 Record Players

24 Audio Tape Equipment

26 Program Control Devices

27 Video Equipment

29 Projection Screens

31 Film Inspection and Cleaning Equipment

32 Learning Laboratory Systems

33 A-V Furniture

34 Reading and Tachistoscopic Devices and Programmed Instruction Devices

34 Transparency-Making Equipment

35 SUMMARY

37 BIBLIOGRAPHY

38 ABOUT THE AUTHOR

Introduction

What does the user need to know about A-V? Lots! Enough to select a proper medium for his message, enough to buy the appropriate equipment, and enough to take proper care of it once he buys it.

That may sound simple—but in this Audio-Visual World, things change fast, so there is always something new to learn about new equipment and new philosophies of communication. Certainly that's the way it's seemed to me ever since those World War II years when I was just a nervous and untrained operator at occasional filmshowings. Then as a college prof, I lived in a tower of higher learning which needed no A-V support. (After all, when one deals only with majestic concepts, he cannot be bothered with earthbound support systems!) So when I entered industrial training in the early 50's, I had to learn it all over again. In fact, only with a steady input of new data, was I able to select media for my programs or initiate purchase orders with some sense of security.

So I have great empathy with those users and buyers who wonder if they're asking appropriate questions at opportune times . . . who want to be better able to recognize good answers . . . who want to be sure they handle their equipment so it performs at peak.

And so this "User's Look at the A-V World."

Not that any one document can ask all the right questions, or can give all the right answers. This is just a start toward a kind of *total* buyer's guide . . . an accumulation of questions, answers and tips on getting the most out of your A-V buying decisions. Someday there will be a technical guide for the professional buyer—but this "first step" is for that vast and usually silent majority who want to learn enough about the audio-visual field to make their purchasing decisions more confidently and more productively.

How This Paper Is Organized

There is so much we users need to know. Sometimes we need the "big picture"—and sometimes we want lots of detail about one issue or one type of equipment. It's my hope that the plan of this discussion will serve both needs.

The first section will deal with five Common Questions About A-V:

1. *Selecting the Medium*
2. *Selecting the Vendor*
3. *Standardization*
4. *Performance Standards*
5. *Maintenance*

The second section looks at each type of equipment now on the market. To organize the types, I could find no better system than that used in *The Audio-Visual Equipment Directory (19th Edition)* published by NAVA. There are 16 types, so I'll not list them here. (They're in the Table of Contents, anyway.) The description for one type won't always parallel that of other types: relevant details vary for each. But usually we'll describe the equipment and its function, its capabilities and limitations, plus some special questions a buyer might ask. There may also be a tip or two on care and maintenance—especially when they directly support the smooth presentation of the message the machine was purchased to communicate.

And of course there will be a summary.

How about a glossary? Well . . . it's my experience that a glossary is like a preface; it's what nobody ever reads! Yet the jargon of the A-V field is vitally important. A buyer needs to know the proper name for A-V equipment and for some of the parts and nearly all the special concepts. He certainly needs to know the special usages some common words take on in the audio-visual context. Like the word "noise." I'd always assumed that noise was merely sounds I didn't like – as near an airport or from early-rising children on a Sunday morning. But in A-V, *"NOISE" means any unwanted signal – even pictures. Whatever obscures or obliterates or contaminates the signal (as fuzzy phantoms on the screen) – that is NOISE.* I used the italics here the same way you'll find them when the jargon is explained in the text: *ITALIC CAPS* for the term and *italics noncapitalized* for the definition. Thus the glossary is integrated into the discussion – so hopefully you will remember these words and be able to use them when you need to later on.

We'll be using the term "Audio-Visual Communications" a great deal – so perhaps we should start there:

AUDIO-VISUAL COMMUNICATIONS is the application of technology to the art and science of transmitting ideas. . . .

"Technology" implies the application of media to meet specific objectives of message transmission – in a system of elements which includes the sender, receiver, and environment (or setting) for reception. "Multi-Media" simply means the selection of the appropriate presentation elements to accomplish the communication task, predicated on the objective, the audience, the instructional strategies employed – and practical considerations such as time and cost. The "Media Mix" may include a variety of presentational modes, including charts, texts, models, and the voice of the presenter; in fact *any* device or activity which contributes to the communications process can be properly considered as a useful element in "multi-media" or "multi-modal" environments for learning.

With the definitions above as a frame of reference, let's begin our informal tour of the Audio-Visual World. . . .

Common Questions About A-V and Its Use

Five of the most important factors any audio-visual user must consider are the issues of Media Selection, Vendor Selection, Standardization, Performance Standards, and Maintenance. Let's look at them in that order.

1. Selecting the Proper Medium

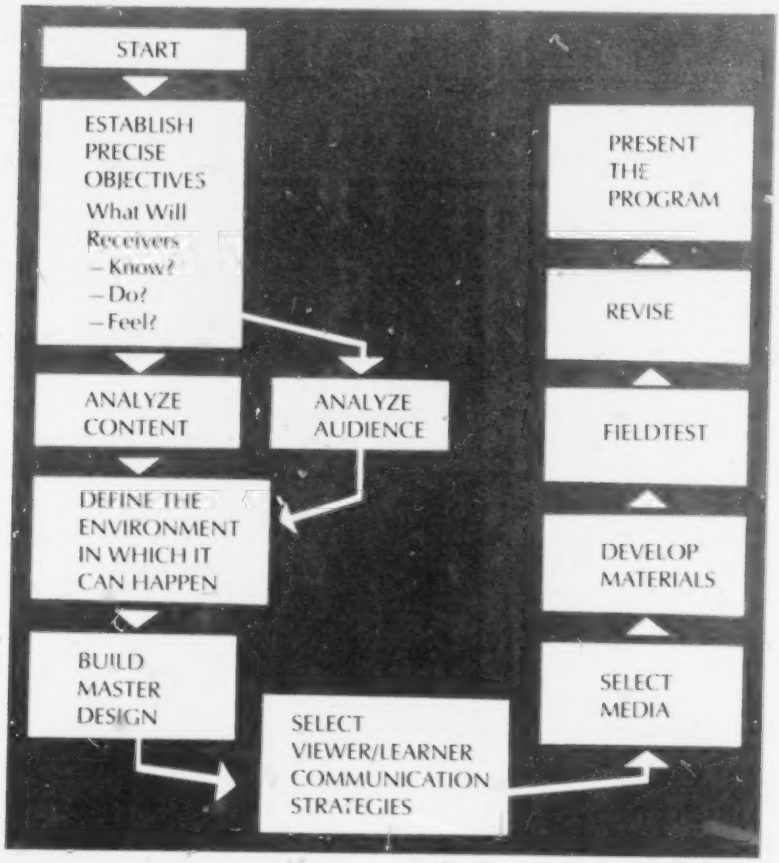
First of all, I must report that there is no "cookbook answer" to the question, "What medium should I select?"

Sometimes (probably too often!) we expect an A-V professional to give us a quick, definite response to questions like, "What should I put into my new Learning Resources Laboratory? Videotape or 16mm?" Or we call him up and ask him to tell us right away, "What visuals do we need for our new Sales Training Program?"

The decisions about the "proper" A-V medium for any given communications task are numerous. As a matter of fact, media decisions properly come very late in the design process. I have always needed something to help remind me of this fact . . . especially when I get itchy to start taking pictures or to get someone busy writing scripts for a film or a recorded case study.

As a helpful reminder to the buyer to put his media selection into the proper perspective, I would offer this process chart:

Media Selection in the Communications Process



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Selecting the Proper Medium

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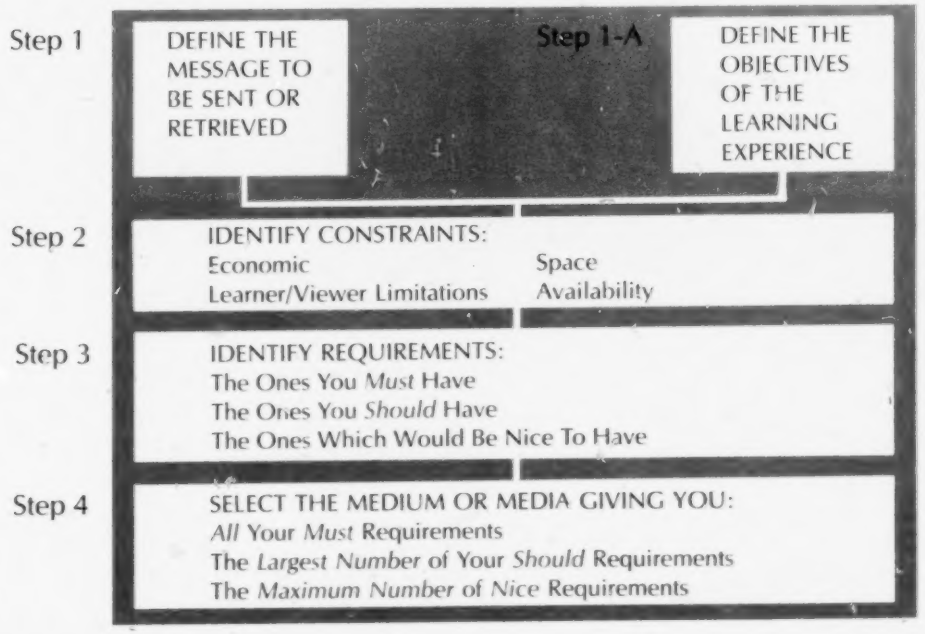
Above all, the process chart tells the layman that before he selects any medium or equipment, he must answer all kinds of specific questions about the message he is trying to communicate . . . and about the response he is trying to elicit from his target audience. It tells him that he must weigh the appropriate media against such constraints as time, budget, and the environment available for communication.

Obviously, no A-V professional can give ready answers to general questions. Equally obvious, no A-V professional will prescribe a solution to a customer whose precise need has not been identified. As a good consultant, the proficient A-V specialist helps a customer build an array of *options*, assessing the contribution each option can make toward the buyer's unique needs. It's sort of like prescribing medicine; it helps to know what ails your patient. In A-V, it boils down to helping the customer fit the medium to the mission: placing the ultimate audio-visual decision well downline in the design of the total presentation or training plan.

Yet as the search continues for a "cookbook" of media selection, each study finally falls back on such terms as "intuition," or "empirical trial-and-error" or "the systems approach." Perhaps the most workable ground rule for media selection is that the "best" medium is the cheapest one which works. Granted, that's not very scientific – but historically it holds up very well.

For precise answers about what medium to employ in a particular training program, information retrieval system, or presentation, we might consider these steps:



2. Selecting the Vendor

There is a three-way relationship between the user – the vendor – and the manufacturer. Whenever we buy equipment, there are a few commonsense considerations involving this relationship. Since we usually deal directly with the vendor, let's concentrate on that facet.

What Do I Want to Know About a Dealer?

1. Is he an authorized vendor of the manufacturer whose equipment I am purchasing?
2. How long has he been in business?
3. Is he an authorized factory service representative of the manufacturer? For how long?
4. Is he a NAVA dealer? (NAVA dealers must meet high standards to qualify for membership)
5. Are his prices equitable – and does he offer a full range of continuing service, consultation, and professional support?
6. What do my peers in the marketplace say about:
   – The reliability of his service?
   – The promptness of his service?
   – His friendliness and professional helpfulness?

The reputable vendor wants your repeat business; he therefore serves you well. To do that, he knows he must help you make effective decisions about both the medium and its maintenance. Since he has this motivation, you can develop with him a solid ongoing relationship – one in which his counsel helps you to ask the right questions and find the right answers.

3. Standardization

Total standardization would seem to be highly desirable. We could use the same tapes on all playback units . . . follow the same steps in setting up and operating competitive (but compatible) recorders, projectors, screens, and machines . . . plug one piece of equipment – or even a single part of it – into any other piece and go on with the show!

First, let's remember that we earnestly want to make our medium fit our message. Logically that means that many different users will end up with many different desires – and these many desires usually can't be met with rigid standardization. The American consumer has learned to insist on a wide range of options and occasionally, unique or tailor-made equipment. And a variety of needs tends to generate a variety of ways to meet those needs. . . .

It occurs to me that an industry-wide policy toward *total* standardization might quickly put the quietus on creativity and on progress. (Why would a manufacturer experiment or conduct research if he might not be able to secure a license for a remarkably new product?) Although realistically, our restraint-of-trade regulations essentially rule out any such all-inclusive standardization which could subvert or inhibit the free enterprise of manufacturers and producers.

Thus, that very array, which sometimes confuses us, is the same array of options which makes it possible for us to communicate a unique message in a unique way to our unique audience. The non-standard state of things makes us realize that "Audio-Visual" is really an inadequate term for a field which might be better called "Multi-Sensory Communications with Individualizing Capabilities." (How's *that* for home-grown jargon?)

4. Performance Standards

Now let's talk about standards. Personally, I've never known them to be a problem. Equipment has done what I expected – subject, of course, to normal wear-and-tear or my own carelessness.

It's vital to remember that there is a distinction between professional A-V equipment and over-the-counter photographic or audio machines designed for home use . . . like the difference between a heavy-duty taxi and an economy car. There is a difference – and reliable A-V manufacturers want their buyers to profit from that difference. They know that if you're showing a home movie, you can afford a little "downtime" – no matter how disappointing. But their professional clients cannot live with such "downtime" when they have a roomful of students or an auditorium full of potential customers. Organizations like UL (Underwriters Laboratories) and NAVA continue to lead the quest for meaningful standards and testing to ensure products measure up to them.

A-V buyers will probably use the equipment in a relatively high-utilization, rough-handling situation. Operating the equipment will be a wide range of people: the naive, the careless, the lazy, the rough, the people-under-pressure . . . who get frustrated every time they handle machinery and an audience at the same time. We would therefore be wise to secure professional equipment – not toys for the home. All the equipment listed in *The NAVA Audio-Visual Equipment Directory* is professional equipment.

As I've said, the equipment I've used has always behaved well. However, in any industry as large as the audio-visual field, there are bound to be cases where individual units don't perform up to standard. If you get such a unit, what can you do about it? Well, suppose you had bought an automobile, and found it rattling when you got it home. What would you do? You'd take it back . . . right? The same action is available to any A-V buyer. Reputable dealers will repair and replace; reputable manufacturers will see to it that their authorized vendors do repair and replace as the warranty provides.

But let's also remember that any warranty works two ways: when we users advertise for bids on one set of standards, we all are ill-advised to accept products which do not meet our standards just because we can save a few dollars. The integrity of the negotiation works in both directions.

5. Maintenance

Good maintenance results from cooperative communications and shared responsibility of three people: the manufacturer, the vendor, and the user. There are some important, and not terribly taxing things we buyers can do to live comfortably with our A-V equipment.

For example, no matter what the warranty says, there's at least one commonsense action any of us can take: to protect all warranties and all instruction sheets in plastic . . . after we have duplicated them and stored them in unforgettable places like alongside the machine itself and in the files where we document the purchase.

Such a procedure is just a little bit of insurance against wasted time. Another one is something I learned the first time I ever travelled with A-V equipment: to carry extra lamps, power cords, and three-prong adaptor plugs. The reason for the spare lamps and the drop cords is obvious; why

the three-prong adaptors? Heavy duty equipment has three prongs – but older buildings aren't always equipped for it. In setting up, it's always wise to attach the grounding wire to the screw which holds the plate to the wall. (Otherwise, the grounding characteristics of the plug are defeated.)

It's also wise to carry masking tape when you travel. (Yellow or white are highly visible, and preferred.) Use it to anchor the power line to the floor. It will not only hold the line flat; it will identify the cord clearly so you and the uninitiated won't trip over it.

Of course just having instructions visible, or spare basic replacement parts on hand, won't guarantee uninterrupted perfection of performance. Any machine will break down at times. This means that when we are making our "Buying Decision" we want to ask, "How accessible and reliable is the maintenance service?" It is certainly true that we want to establish ongoing relationships with those who prove reliable and concerned with our needs. But a "Let-George-Do-It" attitude ignores the fact that effective operation and maintenance also includes us: the user-owner and operator. This means responsibility for keeping equipment clean; for using proper materials in routine maintenance; for cleaning delicate parts with the proper fabrics or liquids; and for carrying it carefully . . . in short, for treating it as if we had paid for it ourselves!

Steady performance results from responsible vendors who deliver ready-to-operate equipment and operators who take care. Above all, it means training people who will handle the equipment on its proper operation and maintenance. Words like "high dependability" and "fully automated" can only be interpreted against the care and understanding the equipment and systems receive in daily use.

This may sound like a pious platitude – but there are facts to support the thesis: Rudy Bretz reports in his *Taxonomy of Communications Media* (by Educational Technology Publications, Englewood Cliffs, New Jersey) that in the Washington County, Maryland school system there are some 750 television receivers. Maintenance records for one of the early years of operation show that 45% of the service calls were solved by plugging the cord back into the wall!

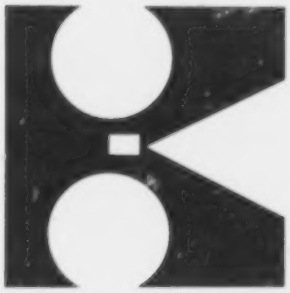
One NAVA official summarizes the effective buyer-dealer relationship in a way which also underlines the maintenance question: "Establish a personal and professional relationship with people who can give you sound advice. Keep in touch by subscribing to one or more publications in the field. (Lists are available from NAVA or in the bibliography at the end of this paper.) Use the member services of associations such as NAVA, the Industrial Audio-Visual Association, or the Association for Educational Communications and Technology. These include newsletters, reprints, seminars, audio cassettes, and other reference materials. But above all, keep the communication channels open with the dealers from whom you secure products. If they helped you fit the medium to your need, they are equally interested in seeing that the equipment maintains itself to continue doing its work for you."

Of course there is much more that can be said about maintenance. Several tips on proper operating and caretaking techniques will be discussed in sections to follow. . . .

Types of A-V Equipment

Using the classifications of *The NAVA Audio-Visual Equipment Directory* as an outline, let's move now to a discussion of specific media . . . and some helpful facts and reference points for every A-V Buyer. . . .

Sound Projectors and Viewers



16mm. Film

Film is essentially a "running" medium, shown from start to finish. Unified segments of a program are occasionally printed on separate loops, and referred to as "Single Concept" or "Short" films. To know the length of any film, one measures feet. In the appendix of *The Audio-Visual Equipment Directory* a "Miscellaneous Table" shows running times for standard lengths. For example, it shows that 1000 feet of 16 mm. film at 24 frames-per-second (sound speed) runs 27 minutes, 47 seconds . . . that 50 feet of Super 8 film at 24 frames-per-second runs 2½ minutes.

Motion picture films are measured in millimeters of width. *NON-THEATRICAL PICTURES*, or *educational and industrial films*, are generally produced in 16 mm. and presented in either 16 mm., Super 8 or 8 mm.

A-V users probably spend more dollars for 16 mm. projectors and films than for any other kind of equipment. The medium has a long history of success; it's a familiar vehicle to both the viewer and the presenter. Many communicators rely on this medium because it combines multiple capabilities – color, motion, action, plot and musical scoring – in polished materials designed to produce new knowledge, skills, and attitudes for target audiences.

There is a huge library of 16 mm. films. Many professional studios produce them for educational and industrial users. Their output ranges through all academic subjects from physics to literature and to such industrial skills as arcwelding – even to topics like creative problem-solving and transcendental meditation for managers! Some industrial concerns use so much 16 mm. film that they have organized their own production units. The film is housed on a reel, threaded through a projector and attached to a take-up reel. Threading mechanisms vary:

- *TOTALLY MANUAL THREADING lets the operator match the film to a path printed on the side of the projector.*
- *MANUAL CHANNEL methods permit operators to press a single lever which opens up a path to thread and remove the film.*
- *AUTOMATIC LOADING permits the operator to insert the film into its entry slot and watch the machine propel the film around the proper path to the take-up reel.*

Most motion pictures must be shown in a darkened room, so if your "auditorium" has a great deal of ambient light, you probably need a projector with a high light output. It's possible to upgrade the light source by inserting larger lamps or changing voltage. But when voltage exceeds the normal lamp rating, the lamp may give more light – but have a shorter life. Example: a 500 watt lamp marked 115 volts, burning on 120 socket voltage would give 16% more light, but last only 60% of its rated life. (No! I don't go around knowing things like that! The data is in another "Miscellaneous Chart" in *The Audio-Visual Equipment Directory.*)

(Continued)

16 mm Film

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No matter how you upgrade your light output, the old idea of equating light with wattage is unreliable. New lower-wattage projectors can actually deliver *more* light than earlier counterparts with lamps of greater wattage. The light output will vary with overall characteristics of the lamp; the buyer today should be more concerned with lumens measured at the screen than with wattage to measure light output. And remember that the relative at-the-screen image brightness is affected by *multiple* factors, including lens selection, screen characteristics and the presence of ambient light in the room.

Now to film sound systems. Sound is recorded on film by two methods:

- *OPTICAL SOUND tracks are composed of the same photographic emulsion as the picture portion of the film and are printed along the edge opposite from the sprocket holes. A small exciter lamp is used to project a beam of light through the track. The varying light patterns are "read" by the projector's sound head – and converted to electronic signals fed to the audio amplifier.*
- *MAGNETIC SOUND tracks utilize a magnetic oxide strip added to the edge of the film. The sound is recorded on this track as in any other magnetic recording.*

How much sound do you need? Well, remember that you want at least three watts for an average meeting room, conference room or classroom. All projectors have at least this much. For an auditorium of 500 seats, 10 watts probably will work out about right. Check the rooms you use: do they have built-in public address systems? Try to hook into this desirable feature when it's available. Your A-V dealer can advise you on making a compatible connection "impedence match" so you don't overload either the equipment or the sound system.

A special feature available on some 16 mm. machines is *ANALYSIS, the capability to move the film through the projector at varying speeds so the viewer can "analyze" the action or the details of the image. Speeds range from very slow to total "stop action" – so you can examine individual frames.* If you need this capability (as you might if documenting minute processes, or teaching dance or calisthenics), then be sure the machine you buy can deliver Analysis Capabilities. And check the films you plan to analyze: if the camera speed wasn't fast enough to record all the detail, no machine on earth can put that detail back in – no matter what the playback speed may be.

What should you look for when you buy projectors? Here's a checklist:

When Buying a 16 mm. Projector . . .

CHECK FOR QUALITIES –	
Simplicity	Especially the loading (Manual or Automatic?)
Portability	Can your operators lift it easily? Will it fit into automobile trunks? How will you handle it on airplanes? How much storage space will it require?
Good Sound and Good Picture	Ask for a demonstration

(continued)

When Buying a 16 mm. Projector
(continued)

Durability	Ask for specifications and endurance test results
Film Handling	Is it gentle on the film? Does it gnaw at the film? Is there excessive film "chatter" as the film passes through the shutter gate?

CHECK FOR FUNCTIONS – Do you need:

	YES	NO		YES	NO
Still Picture?			Fast Forward?		
Motion Analysis?			Fast Reverse?		
External Speaker?			Optical Sound?		
Silent Speed?			Magnetic Sound?		
Remote Control?			Both Types of Sound?		

CHECK FOR SERVICE:

Guarantee	What's the length of the warranty? What does the warranty cover? What *doesn't* the warranty cover?
Is Local Service Available?	A MUST!
Is National Service Available?	A necessity for buyers who travel.

Because the financial commitment to 16 mm. is a heavy one, the purchaser should make a similar commitment to using his equipment properly.

16 mm. Projectors: Five Operational Reminders

1. READ THE INSTRUCTIONS CAREFULLY (as one projector manufacturer suggests: "Please try it *our* way before you try it *your* way.")
   - Clean the film path regularly
   - Use only unbent reels
   - Secure regular professional maintenance
2. An external speaker is a "sound" investment. Most in-machine speakers aren't designed to deliver to large rooms. Check to see if the room has a public address system; if so, plug into that system.

   Put your auxiliary speaker near the screen, and off the floor. (The higher, the better)
3. Quiet running is important; keep listening to your machine. Excessive "chatter" may mean misalignment or lack of lubrication.
4. Multiple lenses (or zoom) are helpful. These are especially worth purchasing if you plan to show film in various rooms or on screens of varying sizes.
5. Clean films regularly to prevent scratches.
   - Buy the cleaning gear you need, plus a manual rewinder, a wet or dry splicer, and cotton gloves.
   - If you haven't the time or facilities, send your films out for professional treatment. Experts suggest cleaning films *at least* after every five showings.

8 mm. and Super 8

An increasingly popular film format – especially for small audiences – is 8 mm. (Though we frequently call it 8 mm., in truth "Super 8" has really superseded it. Super 8's picture is larger – ⅜ the size of 16 mm. versus ¼ for 8 mm.) Super 8 is a common vehicle for single concept films (often silent) and is extremely useful in one-to-one installations – where a single viewer is learning or witnessing the content of the film.

What are the advantages of the format? What are the disadvantages? Here are some of them:

8 mm. and Super 8 vs. 16 mm.

ADVANTAGES	DISADVANTAGES
Cartridge-loading or simplified reel-to-reel threading generally available	Less light output
Small Size	Less sharpness and clarity in large screen projection
Lightweight	Greater "noise" (because the frames are generally magnified proportionately larger than 16 mm; thus flaws in the film are magnified on the screen)
Fits Single-Concept Needs	Fewer library titles available
Readily adaptable to small rear-screen or front-screen applications	
Lower equipment and print costs than 16 mm. (for both original production and purchase off-the-shelf)	

In this medium, both optical and magnetic sound systems are still side-by-side in the marketplace . . . with plenty of advocates for each. The compatability question is hotly contested and continuing. In many small screen applications, Super 8 is supplanting 16 mm. – but the compatability problem continues to hamper the growth of large 8 mm. libraries.

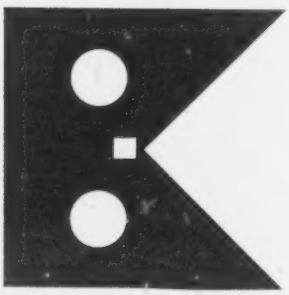
How should buyers decide between 16 mm. or 8/Super 8? Well, here again there's no "cookbook" answer. As openers, the prospective purchaser might ask:

How Many Millimeters Do I Need?

1. How big is my group? (Does it go beyond a small projector's capability?)
2. Am I going to use front screen or rear screen projection? . . . or maybe both? If it's rear screen, will it be full-size or mini-screen?
3. Is all the material I need to use available in the format I am considering?
4. Will I be producing my own films . . . renting from outside sources?
5. Do I want magnetic sound systems so that I can record my own soundtracks directly on the film? (16 mm. magnetic sound projectors are rare – and dual-system machines are comparatively expensive)

Filmstrip Projectors and Viewers

What is a filmstrip? It's a series of still pictures on a strip of film (usually 35 mm. but sometimes 16 mm.) often accompanied by a sound program. The soundtrack is a separate component of the system – not on the



film. The accompanying sound may be in the form of records, audio cassettes, or conventional ¼" audio tape.

"Automatic advance" projectors are increasingly popular – utilizing inaudible pulses on the record/tape to call up the next visual automatically – instead of the familiar audible bell or beep required by manual systems. Virtually all professional programs today are published with dual recordings: automatic (inaudible pulses) on one side; manual (audible beeps) on the other.

Because of new technology (such as the capability of changing images as fast as three times per second – or even faster) a sense of animation is possible. The economy of the filmstrip contrasts favorably with motion pictures – and so this approach is appealing whenever it will adquately convey the message. Another factor of new technology is the rise of cassette-based systems: they now represent more than half of the filmstrip projectors sold with sound, and are increasing in sales percentages each year. (A plus for cassettes: high quality sound which can be conveniently played both *with* the picture – and studied later *without* the picture on portable cassette playback machines.)

In the past, filmstrips were often "the alternate medium" when the communicator couldn't afford more expensive motion pictures. And all too often, early products were little more than illustrated lectures. But a "New Generation" of programming has begun to offer excellent presentational values, including modern scoring and narration and high-impact graphics and photography.

Some Considerations About the Filmstrip Medium

ADVANTAGES	POSSIBLE LIMITATIONS	SOLUTIONS
• **Economy** Filmstrips are comparatively inexpensive A-V communications tools User can accumulate a large library		
• **Ease of Transportation** Projector is lightweight, portable, self-contained Filmstrips are small and portable.	Can get misplaced easily (especially the 16 mm. filmstrips)	Buy files and reference drawers for your library
• **Wide Range of Programs Now Available on the Market**	May need adaptation to fit your particular situation	Create presentation guides which apply to your own needs

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Some Considerations About the Filmstrip Medium

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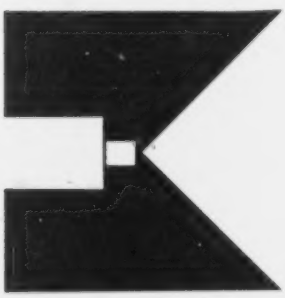
ADVANTAGES	POSSIBLE LIMITATIONS	SOLUTIONS
• **Control of Content**		
Every audience sees the same program	Must always be shown in the same sequence (unlike separate slides which may be edited and rearranged)	Add discussions after showings Insert casestudies before or after showings Design interactive texts for use with the filmstrip Record multiple narrative audio tracks for different audiences

The effective use of the filmstrip boils down, as it does with just about every medium, to the skill of the user . . . and to his ingenuity in maximizing:

1. The strengths of the medium itself
2. The messages in the program he selects or develops
3. The accompanying content (pre- and post-presentation discussion) which makes the program relevant and meaningful to his particular audience.

Slide Projectors



A slide projector is basic equipment in virtually all A-V installations. There are several sizes and formats, but virtually all of the industry uses 2" x 2" (35 mm) slides. Still with us – but in decreasing number – are 3¼" x 4" *lantern slides* used for projection on very large screens, or when extremely fine image detail is required. New "mini-slide" formats are now appearing – but their primary appeal is to the home market.

Buying a Slide Projector: Nine Questions

1. Is the machine reliable, quiet, and relatively jam-proof?
2. How well does it handle slides in different mounts: cardboard, metal, plastic, or glass?
3. Does the slide magazine have sufficient capacity for my needs? Do I require continuous operation (tray vs. rotary)? Is the magazine compatible with other projectors we may already own?
4. Is the machine easy to operate – in the dark?
5. Do I need – or might I ever need – such features as remote control or automatic focus or random-access selection of visuals? *("RANDOM ACCESS" permits the automatic selection of visuals for projection in any sequence desired – regardless of placement order in the tray.)*
6. Is the machine compact, portable, and easy to maintain?
7. Is the lamp output sufficient to provide a bright, clear picture?

Buying a Slide Projector: Nine Questions

(continued)

8. Do I need multiple lenses (and zooms) for varying screen size?
9. Do I need a carrying case and accessories such as remote cord extensions, slide-mounting and slide-cleaning kits?

"Slide-tape" presentations are becoming increasingly popular – in which the projector is automatically advanced by an inaudible pulse on one stereo channel, while the second channel of the tape presents the audio message, narration, music, etc. Several excellent self-contained slide tape machines are now on the market – in addition to separate synchronizers which may be interconnected with stereo tape and projector components.

When purchasing slide-tape equipment, you may wish to start with these questions:

Slide-Tape: Five Questions

1. Do I need an integrated unit, or would separate components be more useful? What are the quality trade-offs?
2. Is the pulse-programming easy to use and easy to re-program?
3. Are the pulse frequencies compatible with other subsystems in my A-V network?
4. How reliable is the pulsing system? (Are signals ever "missed" by the projector – or does the system occasionally "double-trip" the slides?)
5. If the program *does* go out of synchronization, how easily can I lock it back in during the show?

To conclude our brief look at slide projectors, let's scan a short list compiled for me by several A-V experts, summarizing their favorite professional "Tips for the Happy Projector Owner". . . .

Tips for the Happy Projector Owner

1. Buy a full selection of lenses (including zoom) for varying room and screen sizes.
2. Everyone worries about lamp failure. As a simple antidote to the worry, note on the lamp housing the date of the installation. Then replace the lamp on a regular basis BEFORE it blows. Keep the old lamps for back-ups.
3. Buy a carrying case for your projector; cases give you both portability and protection. (And of course, get a case big enough to hold those spare lamps, extra cords, and adaptors you always carry!)
4. Consider a projector table – particularly one with telescoping legs to get the picture over the audience and direct-to-the-screen.
5. Beware of super-capacity trays which may jam when slides warp or fray slightly at the corners. Some thicker slides are not compatible with these copious trays. Not all manufacturers provide a choice of tray sizes, so you may want to make this a buying consideration.
6. Protect the cardboard mounts of your slides with metal or plastic sleeves. Beware of using glass-mounted slides in high-intensity light projectors. In some models, the lamp heat may "cook" or blister the film emulsion.

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Tips for the Happy Projector Owner

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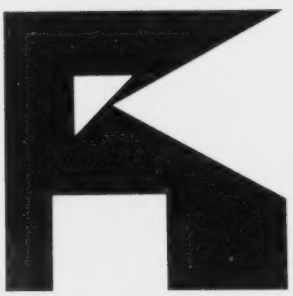
7. Provide drawers and cases to store your slides. Systematic filing systems are a good investment – and especially popular are clear plastic sheets which hold several slides per page, for quick visual access in loose-leaf notebook binders.
8. Your shows can be enhanced by the addition of a *DISSOLVE SYSTEM which alternates two projectors focused on the same screen, creating a smooth visual transition between slides by fading on and "overlapping" their images during the change from one to the next.* Another effective technique: Projecting special "polarized light" slides through a revolving filter close to the lens to create the illusion of motion. The effect is especially useful in animating diagrams, schematics, and dramatic visuals designed for "attention-getting."

Overhead Projectors



An overhead projector places an image on a screen by passing light through a transparent acetate, or other cell, which lies on the face of the projector. *(This glass face of the overhead projector is called the STAGE.)*

On the market one can find water-soluble pens, wax pencils, and permanent felt-tip pens – for creating colorful visuals prior to – or during – a presentation. (Not just any wax pencil of felt-tip pen will project in color; they tend to "break up" or image black unless especially designed for overhead projection.)

Overhead presentations are often aided by such techniques as:

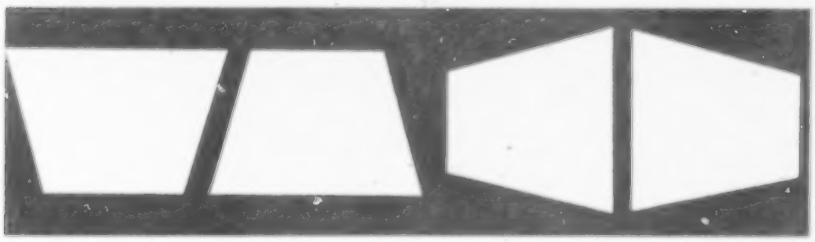
- Acetate overlays which "build" a complex visual one step at a time
- Translucent plastic models to show interaction of moving parts, etc.
- Negative acetates with brightly-colored images against a black background
- Color photograph "lifts" transferred on special acetate from clay-based paper (frequently used in pictorial magazines)
- "Polarized light" transparencies with a rotating filter to create the illusion of motion

There are some important advantages to the overhead projector:

1. The presenter/instructor can face his audience.
2. Both the sender and receiver can work in an undarkened room, with ample light for two-way communication, eye contact, and note-taking.
3. Transparencies are generally easy to make. (We'll discuss transparency-making equipment in a later section.)
4. The machine is relatively simple, and maintenance is not a problem if users take proper care of their equipment.

A few disadvantages:

1. *Photographs can't be projected unless they are converted into* transparencies.
2. The system is particularly subject to keystoning. *(KEYSTONING: the distortion of a projected image, caused by an indirect angle of the projector in relation to the screen.)* As the name implies, a keystoned picture looks like this:



There is a relatively easy "fix" for this problem; it's a piece of hardware, commonly called a *KEYSTONE ELIMINATOR, simply a little arm which juts forward from the top of the standard supporting the screen. At the end of this arm is a hook, attached to the top of the screen – which tilts the screen forward so the image doesn't keystone.* (For lateral keystoning, of course, you just adjust the angle of the screen or the projector until they're aligned properly.)

3. The transparencies are relatively easy to make. (Nope – that isn't a mistake. . . . The ease of making transparencies *can* be an advantage – but it can also be a *disadvantage*. It's a disadvantage to the degree that it tempts the user to slap almost any opaque visual into a transparency maker . . . resulting in unreadable print, fuzzy charts, minuscule diagrams. Such output cannot be called a visual aid; it's a visual hindrance. Thus the easily-made transparency is an advantage to effective communicators, but a hindrance to shoddy presenters. Conscientious designers scientifically determine proper image area and letter size; wise designers keep their content large, dramatic, simple, and un-noisy.)

In selecting an overhead projector, the potential user should probably ask some or all of the questions below:

About Overhead Projectors

ONE MIGHT ASK:	BECAUSE:
1. How big a picture do I need?	If it's huge, you need to get space between the projector and the screen. Such space isn't always easy to find in conference and class rooms. If this is a major problem for you, explore the possibility of projectors with wide angle lenses.
2. Does the machine have an integral spare lamp?	The integral spare lets the presenter merely flick a control to place the spare into operating position.
3. Do I prefer brilliance or portability?	There is usually a trade-off between the two; smaller portable models tend to have less intensity.

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About Overhead Projectors
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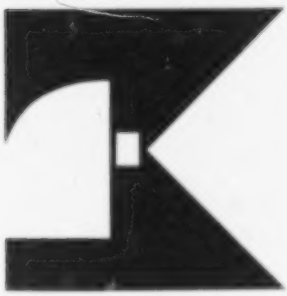
4. *Is the image even?* — In other words, is the image in proper focus at the edges and corners as well as at the center?

5. Are there hotspots? — *HOTSPOTS are splashes of brilliance on the screen – usually in the center.*

Opaque Projectors



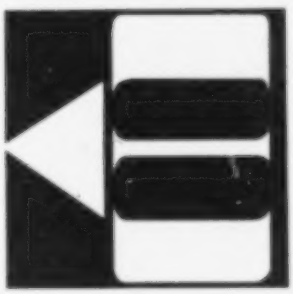
The opaque projector uses the principle of light reflection to create an image of a printed page, or of a flat opaque object.

The big advantage of the opaque projector is the immediate availability of an image; the user does not have to convert his content into any other format before projecting.

Utilization of opaque projectors nowadays tends to occur in special applications where intricate drawings need to be examined by a group. Some people use them as ways to trace drawings onto chalkboards before the regular session – or to trace drawings onto larger charts for repeated future use.

Disadvantages of the opaque projector include the necessity for a darkened room – and the sheer bulk of the projector itself. Plus . . . users of the opaque projector face the old boobytrap of merely inserting an overloaded page into the machine and thinking they have a useful visual aid. Tiny lines in complex drawings will not carry to the people who are supposed to be getting the message. If there is one vital rule for users of the opaque projector, it would center on the cardinal principle: KEEP THE MATERIAL YOU PROJECT SO SIMPLE THAT EVERY ELEMENT, WHEN PROJECTED, WILL BE BIG ENOUGH TO BE EASILY VISIBLE TO EVERY VIEWER. But then, of course, that's true for every good visual, regardless of the projection technique.

Special Purpose Projection Equipment



Special Purpose Projection Equipment includes: Analysis Projectors (for time-motion study and intricate inspection of action); Microform Readers; Micro-Projectors (usually for medical applications); and Multi-Projection Consoles. Some people say that, technically, this special purpose equipment is not A-V equipment at all. But why be exclusive just to be semantic? If we apply our definition that *AUDIO-VISUAL COMMUNICATIONS is the application of technology to the art and science of transmitting ideas*, then we see the importance of this type of equipment: in some ways, it represents "crest of the wave" technology.

Since such equipment gets a special kind of usage, environmental engineering (posture factors, ambience, lighting) become important and specific factors in the selection process. It might not be a bad idea to get the actual or potential users/operators into the examination of the equipment before you purchase. User-analysis is even more important than usual with this special equipment; factors such as fatigue levels, and convenience and comfort criteria should be fully considered in the decision-making process.

Record Players

Record players have long been a standard audio item in the American home . . . but record players for educational and professional use are tougher animals than those found in a livingroom or den. "For effective presentations," stress experienced A-V buyers, "you need professional, heavy-duty equipment. Home players just don't hold up over the long haul."

Those same buyers offer these suggestions when choosing a professional record player:

1. *Ask to hear the equipment in the environment where it will be used. A phonograph which sounds fine in the showroom may sound very different in an auditorium or gymnasium.*
2. *Experienced users also stress the importance of buying top quality speakers. A good amplifier will sound very good with quality speakers – but even an excellent amplifier will sound poor with poor speakers.*
3. *The heart of the phonograph is its drive motor. Since the A-V buyer is investing in a heavy-duty system, he would be smart to ask for life statistics and proof of endurance.*

There are three speed regulation systems. (Lots of speeds, but just three systems for regulating them.)

1. VARIABLE SPEED permits the operator to set the machine for any speed he desires within the range of the machine. *(He might want to do this when analyzing varying tonal or rhythmic patterns, such as when teaching music or dance.)*
2. MULTIPLE SPEED units permit the operator to select one of several speeds at which the unit will operate. *There are four standard speeds: 16, 33⅓, 45 and 78. The figures refer to turntable revolutions-per-minute. Not all multiple speed units offer all four speeds.*
3. SINGLE SPEED units drive the turntable at only one of the standard speeds.

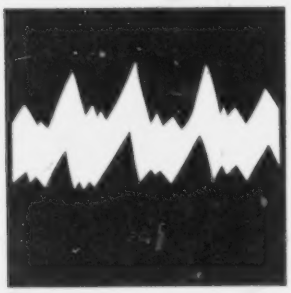
Buyers sometimes ask, "Do I need stereo?" That question is actually rather academic nowadays: stereo records have become standard in recent years. That impacts in two ways:

1. *Your decision for stereo or against stereo is relative only to the output system, because virtually all records released today employ the stereo format.*
2. *You will need to buy a stereo needle (the pro's call it a "stylus") to protect your records – even though you own a monaural machine. (Stereo needles are compatible with either stereo or monaural records; monaural needles are not.)*

Of course, it's wise to supply yourself with extra needles and cleaning cloths . . . and to establish a regular maintenance program. This means training record handlers (the young and the naive) in the proper handling of the records themselves. (Never stack records flat; never touch the grooves; slide the record carefully into its paper sleeve before returning it to the cardboard album jacket; etc.)

Remember: those records are the most vulnerable component in your system. They don't break like the old 78's did when I was a kid – but they will scratch, dent, warp, and melt – if you're not careful.

Audio Tape Equipment



When professional people talk about tape systems, their first caveat is that choice-by-specifications-only can be misleading. Their suggestion: Would-be owners should *listen* to the system in the environment where the equipment will be used.

Not that specifications aren't important; experienced buyers and vendors urge users to acquaint themselves with technical specifications; but they agree that ratings can vary widely in interpretation. The summary of such talk usually ends with the familiar refrain: "The sure test is to *hear* what the equipment does in the room where it will be installed – not to read about it in the catalog."

The second point-of-advice for the buyer of an audio tape system is that the key to a quality system is *quality speakers*. A quality tape provides quality sound with quality speakers . . . and inferior sound with inferior speakers.

Four general types of audio tape systems are now on the market: (1) the reel-to-reel tape deck; (2) the compact cassette; (3) the 8-track cartridge; and (4) the continuous cartridge.

Reel-to-reel is the senior member of the quartet, utilizing ¼" tape and running at speeds which may vary, depending on the playback machine and application, from 15/16 inches-per-second (ips) to 15 ips.

Marketing trends indicate growing acceptance of the internationally-standard "compact cassette" for many applications previously in the domain of large tape decks. Literally hundreds of millions of cassettes have been sold recently throughout the world. Directly related to its success are its unique advantages: portability, relatively low cost, range of program flexibility, and the ease with which cassettes can be stored, played, and replayed, anytime, anywhere.

The cassette's running time is determined, of course, by the length of its tape. But cassette casings are all the same size. So, the longer the running time, the thinner the tape. Thus, a C-60 cassette holds thirty recorded minutes on each side of a thicker tape than a C-120 cassette which gives two hours of recording – sixty minutes on each side. Many cassette users feel that any tape thinner than C-60 stock sacrifices quality and jam-free winding, although increasingly longer tapes *are* appearing on the market.

Incidentally, the playing time of any audio presentation can be determined if you know tape speed and length. In the "Miscellaneous Tables" section of *The NAVA Audio-Visual Equipment Directory* there's a helpful chart showing playing time for various tape speeds and reel sizes. It makes a handy reference when planning your programs. If you know the length-in-feet of the recorded content, you can quickly compute the running time.

The words "cassette" and "cartridge" are frequently interchanged, but in the case of audio tape, they represent two very different types of configurations:

COMPACT CASSETTES use ⅛" tape, moving 1⅞ inches-per second from one spindle to another. Up to four separate tracks can be recorded across the width of the ⅛" tape.

"8-TRACK" CARTRIDGES utilize a continuous loop inside a plastic housing; the tape is ¼" and it runs at 3¾ inches-per-second. Thus the tape is wider, and it moves more rapidly than in the cassette format. The faster speed provides somewhat better sound reproduction fidelity – and consequently, the cartridge has remained the first choice of the music industry. Up to eight separate tracks can be recorded across the width of the ¼" tape.

CONTINUOUS CARTRIDGES employ a tape loop for repeated playback of a recorded message – usually for displays and exhibits. The tape width can be either ⅛" or ¼" – and tape length varies with the total time of the recorded program and the carrying capacity of the cartridge itself.

Playback systems vary widely in quality and performance. The first concern should be with quality, since our judgment will be inflicted upon the ears of all the people who will be listeners to our system. And we already know what the secret is: That's right – a good amplifier and good speakers!

Durability will be important to you; ask for life expectancy statistics of the drive motor, recording and playback heads, internal circuitry – and check out the quality characteristics of the tape/cassette/cartridge you'll be feeding into the machine.

If your system will be heavily used, then it's smart to purchase such maintenance accessories as head cleaners, demagnetizers, splicers and splicing tape – plus adequate storage and identification materials for your recorded programs. About that identification: it should include both brief description of the content (for reference, filing, and quick retrieval), and your name and address.

And speaking of retrieval . . . If you want to protect against accidentally erasing a prerecorded cassette, be sure to punch out those two little tabs on the top of the cassette's plastic housing. Their removal defeats the "record switch" of the recorder. If you later change your mind and want to erase or rerecord the cassette, simply press some mending tape over the openings where the tabs used to be.

Those plastic housings deserve one more comment: good design is more than a virtue; it's a necessity. Check carefully for such details as sturdy roller bearings, "lifetime" lubrication, and precision bonding of all parts.

A word of appropriate caution came recently from a prominent figure in the A-V field: "Cassette fidelity has been something of a problem because of slow tape speed – up to now. But new engineering developments (higher energy oxide coatings, improved base materials) are steadily improving overall performance. Now more than ever, it pays to buy quality cassettes. After all, the tape is the cheapest part of your recording system. Contrast its cost with the cost of the time that you, your script designers, and your listeners will invest in the final presentation. You can't afford *not* to buy the best."

A Thought about Cassette Duplication . . .

When you need tapes in large quantities, you may consider purchasing an in-house duplicator. In this case, your main buying criterion should

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Audio Tape Equipment

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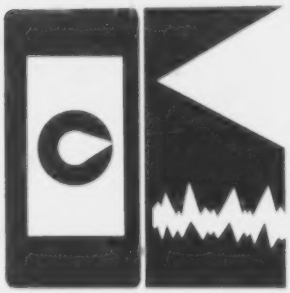
be quality control: the assurance that every tape you duplicate will be a valid reproduction of the master recording. Few areas in A-V technology have grown as rapidly as cassette duplication – and there are today many excellent duplicators on the market.

Problems, when they arise, usually stem from the speed at which tapes operate during the duplication process. Running cassettes at such high speeds necessitates quality materials and equipment – plus close attention by skilled operators.

The primary question is one of volume: Do your duplication needs make it cost-effective to bring the work in-house – or would an outside vendor be better equipped to accomplish the job for you, all expenses considered?

Program Control Devices



Program control devices free the projectionist from manipulations and gymnastics while the presentation is underway, because the control device does the work for him.

When we talk about modern program control devices – also called "programmers" – we are talking about a range of sophistication which most laymen just can't believe . . . sometimes a sophistication they can't believe even *after* reading the specifications . . . or watching the equipment in operation. The device can be a unit so simple that it merely synchronizes sight and sound for an illustrated, automated "little lecture." (Some would say that Sound Slide Projectors are actually a form of program control device.) And then there are systems so complex that they control several different types of projectors (sometimes *dozens* of projectors), plus stereo sound systems, plus switches that will open and close the curtains and turn off the lights in the auditorium!

There are two viewpoints about how to buy these systems. The first says, "Take the systems approach; consider your ultimate needs, short and long term, and buy with them in mind." Another viewpoint says, "Start small; then buy up. Succeed first with simple presentations; then buy higher-power units as your needs grow more sophisticated."

In fact, both viewpoints are compatible. It should be quite feasible to determine the dimensions of your ultimate system; buy the most essential elements first; and gradually build up until you have the total system.

A major rationale for buying a programmer is ease of operation. In fact, a totally-controlled system requires an operator to do little more than push the ON button. (Such as for auto-instructional purposes, or in mini-theatres.) So, of course, the buyer wants to make sure that the system he purchases really *does* make minimum work for the operator, once the components are on-line.

Ease of programming is a major criterion for purchase selection. Will your personnel actually be capable of *doing* the job required to maximize your investment? The electronic programmer is, after all, only a device to coordinate machines; the creative skill of the writer and visualizer is the real power source for a worthwhile program. In talking to users of existing systems, I get the distinct notion that it would be more than merely prudent to ask your supplier to train your people on effective use of the system . . . and to make such training an obligatory part of the sale.

If the expenditure you contemplate is truly sizeable, then you might want to consider professional consultants who can assist you in determining: (1) the precise outputs you really need; (2) the priorities for purchasing each feature (so you can, indeed, build "up"); and (3) the wisest sequence for acquiring each feature. If your application is educational, then make sure you know enough about educational technology (or that you secure the services of a consultant who does) to build a presentation system which best helps students learn . . . as opposed to "toys" which impress visitors but do little for the educational process. I stress this point, because the system will ultimately be as effective as your staff is willing and able to develop programs for it. That ability and that willingness, I have discovered, result only when the system permits effective application of the latest knowledge about learning and human behavior . . . and some basic insights into communications. If your program control equipment is to have a "pay-off" for you, then your staff will need to respect and understand both its power – and its challenge.

Video Equipment

Professional counsel is vital when the laymen approaches the purchase of videotape equipment. The investment is sizeable, and the technology is changing rapidly.

As one sadder-but-wiser purchaser remarked recently, "Video technology is a popular bandwagon to jump on – but look before you leap. The wagon is moving very fast." Any experienced user will tell you that this is a real danger zone – not because video capabilities are over-estimated, but because the equipment is so very sophisticated and the technology is in flux and moving in new directions.

There are two dangers: (1) that the system you install won't fully fit your needs, and (2) that the budgeting you plan won't maintain the system you install. This takes us to a major point: the greatest single mistake made by purchasers is a commitment to hardware before they clearly formulate its real-time utilization and effectiveness. The financial commitment only barely *begins* with the purchase price. In fact, the "front end" investment is, in the long run, the least of the video expenditure. The budget must include plans for secondary expenditures to support the operating personnel; for maintenance, repair, and production costs; for distribution, updating, inventory; for scripts, sets, and creative consultants. Old-timers point out that without the cash to support the system, the investment is like buying a rocket without fuel. A tried-and-true maxim, equally true of yachtsmen and video specialists, is "Start small and achieve success – then buy up." Of course, that's what wise buyers *always* do when the dollars are counted before the final results can be. . . .

This definitely doesn't mean buying "piecemeal." Since the buying decisions in video equipment do indeed represent major financial commitments, they deserve time . . . they deserve *THE SYSTEMS APPROACH, in which you define the ultimate output first, then identify the components and capabilities required to produce that output.* Associations like NAVA urge the prospective buyer to get professional help early in the process. It's one way to avoid the rough road all-too-many buyers have travelled. As a friend once called it ". . . a trail cluttered with the bones of gear overbought and underutilized. . . ."

That "underutilized" is no accidental adjective. When you invest in a

Video Equipment
(continued)

videotape system, be certain that it will be the medium for *many* messages . . . that you have access to (or a staff that can produce) tapes for many programs . . . for a good many years to come.

The potential applications are virtually limitless: to share messages from management . . . to capture lectures for training programs (one of the least creative applications) . . . to monitor remote workplaces. Videotape can serve in support of training which otherwise might be impractical or uneconomical . . . as feedback for sensitivity and group dynamic sessions . . . as reports from remote project management . . . as profit centers which produce tapes for other uses . . . as a means to record television's great moments in history—as they happen.

With the exception of the EIAJ (Electronic Industries Association—Japan) standard for ½" videotape (both reel-to-reel and cartridge), the marketplace offers several incompatible systems.

Would-be users should remember that the video market is in flux . . . and purchasing decisions should be made carefully, with an eye toward:

- *Obsolescence*
- *Compatability*
- *Sturdiness*
- *Low Maintenance Requirements*
- *Ease-of-Service*
- *Capability to secure and produce new "software."*

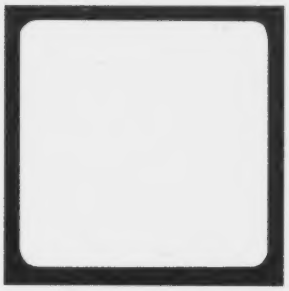
Reputable salesmen and vendors know this—and they respect the care with which you must make your decisions about videotape systems.

A Word about Video Cartridges, Disks, and All . . .

Millions of words have been generated in the trade and popular press recently about the "Video Revolution"—made possible by the advent of new easy-to-use cartridges and disks. At the moment, the marketplace is filled with competing formats (18 at last count) and the number is growing. Some of the new entries are promising; others may never reach the production line. It is well for the prospective buyer to step carefully—and to ask such questions as:

1. *Is the design stable and likely to avoid obsolescence, at least for the life of my purchase?*
2. *What's the performance track record—and is adequate, trained service help available when needed?*
3. *Is software on-the-shelf? Will there be more?*
4. *Is compatability with other video systems in my A-V network an important consideration? (Most competing formats have no interchangeability)*
5. *Is there a competitive system on the way which may dominate the market and force others to change or leave the field? Where will I be then?*

Projection Screens



Front Screens

For openers, a user should know about the two categories of projection: front screen and rear screen:

FRONT SCREEN PROJECTION utilizes an image projected on the forward surface of a light-reflecting screen – from a projector within or behind the audience area.

REAR SCREEN PROJECTION utilizes an image projected on the back surface of a semi-translucent screen placed between the viewer and the projector. Mirrors into which the projector is aimed, and which reverse the image for normal viewing in front of the screen, are a typical component of rear screen systems.

Front Projection Screens are of four general types:

TYPE	ADVANTAGES	DISADVANTAGES
Beaded	– Brightness – Has high light return	– The beads rub off, and the thickness of the beads makes image slightly off focus (although seldom detectable) – Narrower viewing angle than Matte White
Matte White	– Most accurate image for sharpness & color	– Comparatively low light return
Lenticular	– Brightness; returns light with sharpness equal to beaded screen – Rejects ambient light	– Some problem with light "fall-off" for audiences on side angles from screen
Super Bright	– Brightest of all; can even be used in some outdoor daylight conditions	– Narrowest viewing angle of all (viewing clarity from the sides falls off sharply)

When one buys a screen, he should quiz himself not only about the economics of the purchase, but also factors of logistics and utilization. A checklist, with appropriate comments, might go like this:

QUESTIONS	RELEVANT COMMENTS
How big a screen do I need?	The width of the screen should be at least one-sixth the distance that the farthest viewer is seated from the screen.

(continued)

Front Screens
(continued)

QUESTIONS	RELEVANT COMMENTS
How close to the screen can I place my viewers?	The nearest viewer should be two widths away from the screen to avoid eye fatigue and discomfort.
How do I maintain good sightlines for all my viewers?	Many presenters like to "wrap the viewers in the image," so they prefer big screens. Even so, they must place the screen quite high to prevent the heads of some viewers from getting into the sightlines of others. When you put the screen high, you may have to adapt for keystoning.
How is the screen affixed to the roller?	Smart buyers inspect the attachment: if they plan frequent up-and-down action they want something stronger than mere staples in a wooden roller.
How can I protect my screen?	Two methods come immediately to mind: 1. Keep it rolled up when not in use. 2. Secure a covering to protect it from dust, wetness, and heat. (This is especially important with portable screens.)

Rear Screens

Rear projection is becoming increasingly popular: installations range from large, permanent in-the-wall settings, to tiny portable screens used on table tops for sales presentations or individualized study.

The materials for rear projection screens tend to fall into three types. The chart below lists them and tells a bit about each.

MATERIAL	COMMON USES	ADVANTAGES FEATURES
Glass	– Large screens – Permanent location	– Easy to clean – Good sound isolation
Plexi/Acrylic	– Small or large screen locations	– Lightweight – Resistant to breakage
Flexible	– Small screens – Portable installations	– Portable – Lightweight

In rear screen installations, design of the projection booth is a key factor – even when it is just a simple box housing a projector and a student learning carrel or display unit. The critical elements are:

(1) Space to accommodate all system elements

(continued)

(2) Lamp power for comfortable viewing

(3) Noise reduction

(4) Good ventilation

(5) No ambient light within the booth "washing" the screen

How do you decide between front screen or rear screen projection? Sometimes it's a decision some architect made for you long before you arrived: thanks to inflexible constraints of available space or ambient light. Both modes of projection have their champions and detractors – and this brief tour can only suggest a little poem for contemplation before moving on:

Front or Rear?

Which expert do you hear?

"Front has lots more lumens to the side!"

"Rear is best in a lighted room!" someone else cried.

"But *I* like the clarity of a light beam overhead!"

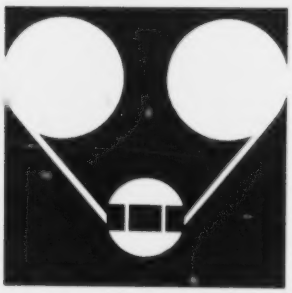
"But *I* like the magic of a hidden beam instead!"

As the factors are debated, with both sides right and true,

The ultimate question remains: Which is best for *you?*

For a technical discussion of the pro's and con's of front vs rear screen projection, you may wish to read the booklet; *Designing for Projection,* available from Eastman Kodak, Rochester, N.Y. 14650.

Film Inspection and Cleaning



The Audio-Visual user presumably needs motion picture film inspection and cleaning equipment when he has enough films to make it more economical (of time and money) to clean them himself than to send them out for professional cleaning.

No matter how careful you are when handling film, prints *do* get dirty . . . and in normal use they *do* get torn and bent.

How often should film be cleaned? Well, most professional circulating libraries clean a print after every showing. That's why they like you to return the film "tails up." *(TAILS UP: the professional jargon for un-rewound . . . the position the film is in after it has been shown.)* Even if you don't opt for this rigid Show It – Clean It cycle, at least consider this vital axiom: If you can see a smudge on the film while you are visually inspecting it, that smudge is sure to produce "noise" in your presentation . . . and probably is abrasive to the film itself.

How many films on-the-shelf would warrant an in-house film inspection facility? There's no magic cut-off point: with "X" number of films you'd be smart to send them out for cleaning; over that number you would save trouble and dollars to do it yourself. You will just have to develop your own cost-effectiveness formula based on the size of your library, the number of cleanings you plan, and the cost of the service as priced by competent professional shops in your location.

(continued)

Film Inspection and Cleaning
(continued)

However, when the answer comes up, "Yes, I need my own facilities," then your need involves at least these elements:

Splicer – Wet (hot or cold) or dry

Cleaner – For use in a well-ventilated area

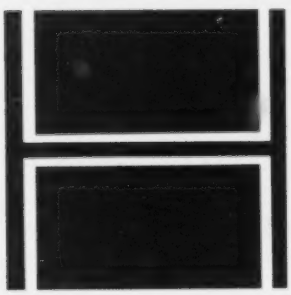
Inspector – For locating torn sprockets

Rewind Equipment – Manual or automatic

Opening your own shop, you'll probably begin with a manual operation; larger installations can effectively utilize automated equipment in which the machine detects the flaws, stops the film, and even makes minor repairs.

But even before you get yourself a film repair and inspection shop, there are two simple tools which every system can effectively maintain to keep the films running: (1) a manual re-wind set-up, and (2) a splicer. With this equipment, you can "go on with the show" even when you encounter emergency breaks. For all such operations, a pair of cotton gloves will pay big dividends in protecting the film during handling.

Learning Laboratory Systems



What's a Learning Laboratory System? In simplest terms, it's a delivery system for programmed (or semi-programmed) instruction.

If you're seeking such a delivery system, you have a wide range to choose from. They vary from simple headset listening devices (Single or multiple units) to highly sophisticated installations (usually permanent) which elicit a response from one or more trainees – then record, analyze and display the responses. The display may be in the form of feedback to the learner to reinforce his response, or feedback to an instructor for monitoring the progress of an individual (or a class).

One of the most popular "learning machines" is a device known as an "Audio Card Reader." An Audio Card Reader utilizes a magnetic strip printed on a card which passes through an audio playback unit. These "talking flashcards" are especially helpful in language training, speech rehabilitation, and vocabulary acquisition and improvement. It's a simple system – and highly effective.

Because most multiple-purpose systems can be built module-by-module, the old familiar axiom applies to the buyer of learning laboratories: "Buy small . . . then grow from there." To this, add that new, now-familiar axiom: "Use a *Systematic Approach* to help in the decision-making process."

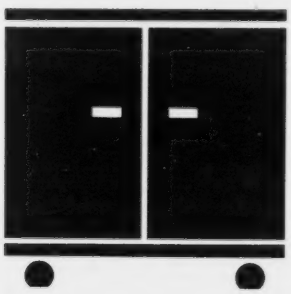
If your system promises to be even halfway big (lots of feedback analysis, many trainees and varying kinds of programming), get good technical consultation. This means consultation not only from the electronics technician, but also from the communications and learning specialist. The buyer needs to make certain that sound learning options are available through the equipment. He would also be smart to make certain that he has an immediate need for utilization high enough to justify the cost . . . that there are ample learning materials available for the units he buys . . . that he has a continuing source of these programs (either from the marketplace or from an in-plant staff trained in their preparation).

Let's summarize our discussion of learning laboratories with a list of salient pre-purchase questions worth asking:

Learning Labs: Which to Buy?

1. How many relevant programs exist now? (If few, can I generate more?)
2. How easy is the machine to program? How flexible for fieldtesting and reshaping presentations?
3. Are the costs proportionate to the contribution the system will make to my total needs?
4. Is the system student-oriented? . . . viewer-oriented? (That is, does it easily accommodate his/her active participation, comfort and convenience?)
5. Is it bug and jimmy-proof?
6. Can it be operated with minimum instructions to the trainee/viewer?
7. Are the optics good with minimum eye fatigue?
8. Is the presentation made with good audio output?
9. Does the engineering permit flexibility – and full use of such instructional techniques as reinforcement, recycling, or branching?
10. How fail-safe is the design (to avoid such pitfalls as downtime and out-of-sync operation)?
11. Is it relatively maintenance-free, with solid state circuitry and theft-proof components?
12. Does the equipment have a track record of dependability, effectiveness, longevity of successful operation? Is there corporate reliability to stand behind the product?
13. Is there an established system to teach the teacher and to instruct the student in proper operation?

A-V Furniture



"A-V Furniture" includes a lot of things: stands and tables for projectors, storage cabinets, study carrels, listening tables.

Nobody really needs to tell you the important criteria for this kind of equipment; you well know that durability, portability, design attractiveness, and comfort are the important issues.

But watch out for that factor of "comfort." Any wise planner doesn't want his audience (especially his audience of learners) to be so doggone comfortable that their physiologies relax and dull their mentalities! Obviously he has no intention of inflicting pain on an audience; we're talking about being *just* comfortable, not *too* comfortable.

Some good questions to ask about the A-V furniture you buy:

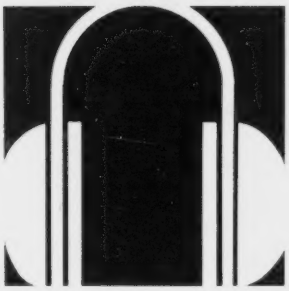
1. Will it take the abuse it will receive?
2. Will it show the abuse it will take?
3. Is it attractive as well as rugged?
4. Is it flexible for multiple usage?

(Continued)

A-V Furniture
(continued)

5. Is it capable of modular applications?
6. Is it user-designed, for ease of application?
7. What warranty does the manufacturer offer?
8. What is the comfort index? Too low? Too high? Just right?
9. Is upkeep minimal?
10. Does it come knocked-down or assembled? Is assembly uncomplicated?

Reading and Tachistoscopic Devices and Programmed Instruction Devices

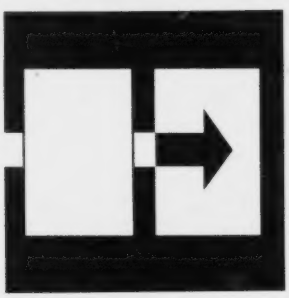


The NAVA *Audio-Visual Equipment Directory* treats these as two distinct types of equipment – although the criteria for their selection and purchase are nearly identical.

Indeed, the key points are really the same as those which we talked about when discussing learning laboratory systems. The buying decisions are based on the same logic. We won't repeat those points here, except to summarize:

1. Are the optics designed to combat learner fatigue?
2. Are the audio outputs capable of maintaining deep learner interest?
3. Is the equipment flexible enough to accommodate:
   - The numbers and varieties of programs I will communicate through it?
   - The numbers and types of viewer/listeners who will be using it?

Transparency-Making Equipment



Transparency-making equipment will provide you with materials for two types of projectors: the overhead and the slide projector. When you need this capability, and before you buy, experienced professionals would urge you to take four specific steps . . .

- First, ask for a demonstration. While you are watching the demonstration, get data and first-hand ideas about the expense and inventorying of the input materials.
- Second, check for fidelity. Compare the original with the reproduction. Are the images exact? Is the color value equal?
- Third, examine the engineering. Is the machine relatively simple to operate and maintain? Is it fail-safe – to protect original art from damage?
- Fourth, inquire about operator training. Does the vendor offer initial training? Is it offered on a recurring basis?

There are several different processes for creating transparencies, such as Wash-Off, Heat Transfer, Diazo, Photographic, Diffusion Transfer, and Xerographic. These processes are quite different from one another – not only in complexity, but also in permanence and variety of their product. They also require different types and qualities of "master," and some methods destroy the master original in the process of making a transparency. To pick the process best suited to your needs, look at all of them while you're in that "demonstration mode."

Again, seek the counsel of vendors and fellow users – matching their recommendations against the projected production volume predicted for your facility. Above all, ensure the A-V equipment you select will deliver the product your projectors will project. There's nothing quite so disappointing as to have your equipment crank out an opaque facsimile when you were expecting a transparency to use on your overhead projector!

Summary

At this point, having looked at all that A-V equipment, I must remind myself – and my readers – that we have just begun to scratch the surface. There is so much more the truly well-informed user might know – to be certain that every one of his buying decisions is the best possible – a truly professional decision.

The A-V buyer usually goes astray whenever he selects a medium before he has done a thorough job of defining his communications objectives. That, above all others, is a sure giveaway of amateur status! Of course it's easy to do. With so much new equipment, with so many attractive improvements in the old standard machines . . . naturally, we tend to see a good thing and want to put it to use.

Patience and practical analysis are the necessary counter-agents in fighting that tendency. Appropriateness, certainly, is the characteristic of the mature decision about media . . . appropriateness to the objective, the message, and the audience.

I keep reminding myself how much information I still have to glean from lots of people . . . like reliable manufacturers, vendors and consultants . . . like experienced users who can tell me so much about so many things.

One thing is certain: the A-V field is evolving from an attractive smorgasboard of visual aids – toward a core-of-curriculum system and increasingly sophisticated philosophy of Educational Technology. . . .

And growth is the name of the game. So I tell myself that the only thing I have ever learned is that I still have a lot to learn. When I apply this to the A-V field, I fall back quite comfortably on a practical list of "Fourteen Commandments of A-V Purchasing" which a group of us – both users and makers – developed one lunchtime recently. We tried to hold ourselves to the traditional quota of ten commandments, but finally decided that an A-V buying decision is important enough to justify fourteen!

Our suggested "Commandments" follow on the next page. . . .

THE 14 COMMANDMENTS OF A-V PURCHASING

1.
Decide on your message BEFORE you decide on your medium.

2.
Ask for the BENEFITS of the system you buy . . . not its shiny surface features.

3.
Consider carefully the need for enabling facilities, for maintenance, and for service.

4.
There are few universal rules in the art and science of media selection. The "best" medium for a specific application is simply the "least costly one that works." Making that decision is a mix of pragmatism, experience and showmanship . . . plus a sense of what the audience wants – and needs.

5.
An expensive toy is only a toy; Audio-Visuals can and must pay their own way as part of your communications system.

6.
Resist the temptation to keep up with the Joneses. Just because they have a new widget, it isn't inevitable that you must buy one too.

7.
Pick your vendor carefully . . . as you would a doctor, a lawyer, or anyone else from whom you expect professional competence.

8.
Integrity works both ways: when seeking bids, never advertise one set of standards – and then accept another.

9.
Remember that in the A-V field, price and quality are partners.

10.
In any presentation, it is nobler to succeed simply than to fail on a grand scale.

11.
Machines, like people, need tender loving care. A regular program of preventive maintenance with the necessary spare parts *on hand* will save many hours of downtime.

12.
Cleanliness is just about next to godliness.

13.
A competent A-V dealer doesn't sell only equipment or materials; his other products include integrity, service, warranty back-up, news from the field . . . plus help in deciding what to buy and what not to buy.

14.
When in doubt, always seek professional help!

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About The Author

In 1952 Dugan Laird entered industrial training by joining the Education and Training Department of United Air Lines in Cheyenne, Wyoming. He has been active in this field ever since, writing and speaking and leading seminars. In 1970 he became an independent consultant who has expanded the area of his activity to other nations.

For ten years before 1952, Dr. Laird was a teacher: five years in secondary schools in Iowa, five more on college faculties in Minnesota, Kansas, Illinois and Indiana. When he left teaching, he was on the faculty of the School of Speech at Northwestern University, from which he earned both his M.A. and his Ph.D degrees.

As a writer, he is best known for the monthly column, "Notes from a Training Director," in TRAINING IN BUSINESS AND INDUSTRY. He has also written for TRAINING AND DEVELOPMENT JOURNAL, EUROPEAN TRAINING, PARTNERS, MANAGE, THE PERSONNEL JOURNAL and JOURNAL OF PERSONNEL QUARTERLY. He has written or co-authored four books on subjects such as business writing and establishing training systems in developing nations.

In 1971 the American Society for Training and Development honored Dr. Laird with a special award for his contributions to the training profession; in 1972 he appeared at the First International Training and Development Conference in Geneva, Switzerland. He has previously conducted management and training institutes in India as well as throughout the United States. Among his clients are Frito-Lay, Eastern Airlines, The Inter-American Development Bank, Society of Manufacturing Engineers, Buick, Ford, Procter and Gamble, The Department of the Army and Southern Railway System. He is a member of The American Society for Training and Development and The Training Research Forum.